Remarks

Claims 1-17 are currently pending in the present application with Claims 18-31 having been withdrawn pursuant to a restriction requirement. However, if claim 1 is found to be patentable, then Applicants respectfully request re-instatement of these claims, as the content of claim 1 will constitute a Special Technical Feature.

The claims are amended herewith by cancelling Claim 17. As no new matter is added by this amendment, its entry is proper.

Claim 17 was rejected under 35 USC § 112, second paragraph. As this claim has been cancelled, this rejection is moot.

Claims 1-16 are rejected under 35 USC §103(a) as being unpatentable over Kale et al (US 5,773,155) in view of Winslow et al. (US 5,534,472) and Kurtz et al. (US 4,339,507).

a) Description of the invention

As described in the specification (see pages 1-3) the composition of matter claimed in the present invention can be used to provide films with good processability/extrudability characteristics (e.g. low neck-in and high draw down) together with desired physical characteristics (e.g. toughness and abuse resistance). For most compositions these properties are usually considered to run counter to each other such that as extrudability gets better, toughness gets worse, for example.

The Applicants have discovered a unique composition of matter which exhibits this desired combination of properties. The claimed composition of matter can be characterized by its unique rheology. The rheology is characterized mathematically by the equation in claim 1, which is graphically depicted in Figure 2.

The unique rheology is believed to be due in part to the existence of significant amounts of both low molecular weight molecules and high molecular weight molecules in the overall composition. This appears in claim 1 when it is recited that at least 7% of the composition will have a molecular weight greater than 1,750,000 g/mol, but no more than 23% will have a molecular weight greater than 85,000 g/mol.

Claim 24 is similar to claim 1 except that it covers the composition after it has been converted to a film layer. As known in the art (and explained at page 10, line 6 of the specification) when exposed to the fabrication conditions, the composition gets modified. Thus claim 24 is the same as Claim 1, with a modified equation for the slope to reflect the changes in rheology after processing.

Claim 27, is an attempt to describe material of Claim 1 according to the preferred way of making the composition. As explained in the specification the high molecular weight (i.e. molecules greater than 1,750,000g/mol) can come from a particular type of LDPE (in particular one which is characterized by having a Mw(absolute)/Mw(GPC) ratio greater than about 3.0), while the portion having a molecular weight less than 85,000 g/mol can come from a linear or substantially linear low density PE ("LLDPE"). While this claim indirectly describes a preferred way of making the composition of the invention, the important aspect in terms of performance is that the resultant blend will meet the limitations of claim 1 or 24.

b) Kale et al (US 5,773,155)

While claim 27 has been withdrawn from consideration (pending the request to re-introduce the withdrawn claims upon the indication of allowance of claim 1), it is useful to consider as it is believed that a material meeting the limitations of this claim will also meet the limitations of claim 1. The Examiner has also taken this approach pointing out that the specific examples of Kale disclose substantially linear ethylene polymer having melt index of 4.75 g/10 min, a melt strength of 1.3 cN together with an LDPE having a melt index of 0.42 and a melt strength of 25.4 cN. The Examiner then states that these polymers are identical to those disclosed in the instant specification. Applicants respectfully contest this assertion.

Melt index and melt strength are not enough by themselves, to adequately characterize the specific LDPE recited in the specification and claim 27. Applicants have found that the desired properties are obtained when using an LDPE with a broad MWD (e.g. an MWD greater than 10), and in particular an LDPE having a Mw(absolute)/Mw(GPC) greater than 3.0. As discussed in the specification at page 11, lines 26-29, the applicants have discovered that these properties can be obtained using an autoclave reactor with chilled ethylene feed. The Examiner has argued in paragraph 6 of the Office Action dated September 21, 2009 that Kale in effect teaches (in column 10, lines 14-16) using a chilled ethylene feed when stating that in order to maximize melt strength the reaction zone temperature differential should be maximized. Applicants respectfully submit that a person of ordinary skill in the art would understand the "reaction zone temperature differential" to refer to the temperatures of the reaction zones in a multiple zone reactor and not to the

temperature differential between a reactant feed and the reactor. This position is further supported when Kale states that another factor for increasing melt strength is "higher gas inlet temperature" (column 10, lines 18-19). Thus, contrary to the Examiner's position, Kale expressly teaches away from using a chilled ethylene feed.

In order to demonstrate the effect of using a chilled ethylene feed, an experiment was conducted to make similar resins except that one is made with chilled feed while the other is not. The results of this experiment are attached to this response in the form of a declaration of Thomas Oswald. That declaration also compares another resin which does not meet the Mw(absolute)/Mw(GPC) greater than 3.0 limitation, although it is not known whether such resin was made with a chilled feed. As seen from that declaration, resin blends where the LDPE meets the Mw(absolute)/Mw(GPC) greater than 3.0 limitation have better coating performance, and such an LDPE results from using a chilled ethylene feed, rather than a higher gas inlet temperature as taught by Kale.

As the LDPE resin in Kale is clearly different than that taught by the applicants, it follows that Kale also fails to teach the limitations of Claim 1, and indeed the declaration of Thomas Oswald confirms this. Accordingly neither the composition of claim 1 nor the compositions of claim 24 and 27 are taught by Kale.

c) Kurtz et al. (US Pat. 4,339,507)

The Examiner has also cited US Pat. 4,339,507 to Kurtz et al. Like Kale, Kurtz fails to disclose an LDPE meeting the Mw(absolute)/Mw(GPC) greater than 3.0 limitation of claim 6 or 27. Considering that Kurtz does not use a chilled ethylene feed to make the LDPE portion of its blend, and offers no other means for achieving an LDPE with a Mw(absolute)/Mw(GPC) ratio greater than 3.0, or any other means for achieving more than 7 percent of material having a molecular weight greater than 1.750,000, it is apparent that its blends will also not meet the limitations of claim 1, particularly with respect to the limitation of S or the limitation of CDF LS fraction of more than 0.07 at a conventional GPC molecular weight of 1,750,000 g/mol.

d) Winslow et al. (US Patent 5,534,472)

The Examiner has also stated that while Kale and Kurtz fail to specify the rheology of the composition, US Patent 5,534,472 to Winslow teaches that the plot of the natural log of G' versus the natural log of G'' depends upon MWD and long chain branching, and therefore concludes that it would have been obvious to one of ordinary skill in the art that the composition of Kale in view of Kurtz would intrinsically have the claimed rheology. It is important to understand that the applicants are not claiming the relationship of G' vs. G'' itself, but are using that parameter to define a narrow set of materials. Only a unique set of blends satisfy the claim in the instant invention regarding the slope, S, of the plot of natural log G" versus natural log G' being greater than a threshold value. This is depicted graphically in figure 2 in the present application. Blends designed for extrusion coating applications in the prior art have followed the principle that an optimal value of melt strength is necessary for good processability. Counter to this long-accepted principle, the blends of the instant invention often have values of melt strength which are too low to measure at normal testing temperatures (e.g. 190°C). Blends with a slope, S, above a threshold value have a unique set of rheological properties that are unexpected based on the prior art.

While the current invention claims high values of the slope, S, of the plot of natural log G" versus natural log G', the patent by Winslow et al states that low values of the Elasticity Response (ER) are desirable for good processability (column 9. lines 54-55). ER is proportional to the value of G' at the frequency in which G" crosses 5000 dynes/cm^2. Although both S and ER are determined from dynamic rheology data, they correspond to fundamentally different properties. In particular, many products with a low value of ER do not possess the unique processability of the blends of the instant invention.

To demonstrate that Winslow's teaching of low ER does not inherently disclose the high S values recited in claim 1, the ER values and S values of several of the resins used in the present application were determined and plotted against each other, and found to have no correlation. This data is included in the attached declaration from Jeffrey Weinhold.

Accordingly, Winslow does not teach compositions having the S values recited in either claim 1 or claim 24.

e) Oswald et al. (US Patent application 2003/0032731)

Finally, the Examiner has also rejected Claims 1-17 over US 2003/0032731 to Oswald et al. Like Kale, Oswald fails to disclose an LDPE meeting the Mw(absolute)/Mw(GPC) greater than 3.0 limitation of claim 6 or 27. Considering that Oswald does not use a chilled ethylene feed to make the LDPE portion of its blend, and offers no other means for achieving an LDPE with a Mw(absolute)/Mw(GPC) ratio greater than 3.0 or any other means for achieving more than 7 percent of material having a molecular weight greater than 1.750,000, it is apparent that its blends will also not meet the limitations of claim 1, particularly with respect to the limitation of S or the limitation of CDF LS fraction of more than 0.07 at a conventional GPC molecular weight of 1,750,000 g/mol.

f) Summary

Accordingly, it si respectfully submitted that none of the references cited by the Examiner expressly or inherently disclose the unique composition claimed by the Applicants. In particular there is no disclosure of the use of an LDPE having a Mw(absolute)/Mw(GPC) ratio greater than 3.0 in a blend with an LLDPE, and also no disclosure of a composition having the the rheology as evidenced by the high S values, or the requisite amounts of molecules having a high molecular weight (i.e. greater than 1,750,000). As shown in the specification and accompanying declarations, these properties lead to the unexpected result of better coating properties.

Accordingly reconsideration and reversal of the rejections of claims 1-16 is courteously requested. Further, as claim 1 does define a contribution over the prior art, Applicants courteously request that claims 18-31 be re-introduced into this application.

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